

ABSTRACT

Disclosed here is an information storage device that enables information to be written/read in/from a hard disk fast using a metal probe instead of a magnetic field that has made it difficult to write/read information in/from the same. The metal probe is brought closely to the surface of a multilayer film that includes a magnetic metal layer, a non-magnetic metal layer, and a magnetic metal layer up to a nano-meter order distance from the surface. The distance between the metal probe and the surface of the multilayer film, as well as the voltage to be applied are changed to change the state of the quantum well generated in the multilayer film, thereby changing the magnetizing direction relatively between the two magnetic metal layers. To read magnetization information from the hard disk, a change of an optically induced tunnel current is used. The change of the tunnel current is caused by a change of a plasmon resonance energy according to a relative change of the magnetizing direction between the magnetic metal layers. The tunnel current flows between the metal probe and the multilayer film.